

## Fitness of animals for transport to slaughter

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**Abstract** – Fitness for transport is an important factor affecting the potential for suffering during animal transportation. Examination of Canadian condemnation statistics, surveys of animals transported to slaughter, and legal case studies show that current guidelines and regulations do not always ensure that only fit animals are transported. Consideration of the pathophysiological implications of ill-health and injury on an animal's response to the potential physical and physiological challenges that can occur during transportation can assist in identifying the welfare implications of transporting compromised animals.

**Résumé** – **Aptitude des animaux au transport vers l'abattoir.** L'aptitude au transport est un facteur important affectant le potentiel de souffrances durant le transport des animaux. L'examen des statistiques de condamnation canadiennes, des enquêtes sur les animaux transportés à l'abattoir et des études de cas juridiques montrent que les lignes directrices et les règlements actuels n'assurent pas toujours que seuls les animaux aptes sont transportés. La considération des répercussions pathophysiologiques d'une mauvaise santé et d'une blessure sur la réponse de l'animal face aux défis physiques et physiologiques qui peuvent se produire durant le transport peut aider à identifier les répercussions sur le bien-être du transport des animaux fragilisés.

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### Introduction

**T**he transportation of animals to slaughter is an integral step in livestock production that can be conducted without causing suffering, i.e., without experience of a prolonged or severe negative/unpleasant affective state (1,2). However, to avoid suffering considerable attention has to be given to the manner in which animals are transported and the fitness of the animals for the intended journey. This paper reviews the literature and presents data derived from published Canadian statistics to identify the need for those involved in the transportation of animals to slaughter, to give careful consideration to the manner in which animals are transported and to the fitness of the animals for the intended journey. Most animals sent to slaughter are healthy and physically fit but, depending on the duration and quality of the journey, transportation can in some circumstances represent significant challenges even to fit and healthy animals. These challenges are greater for animals that are weak, diseased, or injured. Those animals are most likely

already experiencing welfare issues, such as pain and sickness, before they are transported. In this condition they are less able to cope with the extra challenges associated with transport, such as getting on and off the vehicle, interacting with other animals that are nearby and may not always be part of an established social group, maintaining stability, avoiding fatigue, feed and water restriction and extreme thermal environments.

According to Grandin (3) “the single most important issue is having a fit animal for transport.” “It is impossible to assure good animal welfare during transport if the animal is unfit.” In Canada, the *Health of Animals Regulations* (4) specifies conditions that are considered to make an animal unfit for transport and guidance has been developed on how to assess fitness for transport (5). However, the transportation of unfit animals is a frequent cause of non-compliance with the *Health of Animals Regulations* (6). In Canada, some conditions are described as compromising the ability of an animal to cope with transportation, but animals with these conditions are permitted to be transported if certain provisions are made, e.g., if sent for slaughter, they can only be transported locally and directly to the nearest suitable place for slaughter, they must be segregated, loaded last, and unloaded first. However, the effectiveness of the mitigation measures to avoid the additional suffering likely to be associated with transportation of a compromised animal is questionable and there are differing views about the types of conditions that should be listed in the compromised animals category and on their ability to cope with long journeys. If compromised animals are transported on long journeys, they are likely to continue to experience pain and discomfort, there is a

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risk of deterioration of the animal during the journey, and pre-existing conditions are likely to be aggravated by transportation.

An examination of condemnation statistics, published surveys of animals sent to slaughter, and cases of enforcement action taken by the Canadian Food Inspection Agency (CFIA), show that a proportion of the animals sent for slaughter have identifiable pathological conditions that were present before transportation, and this could have affected their ability to cope with transportation. Producers have to balance the potential financial return from transporting an animal that is not in good health with the potential risk of suffering to the animal, financial loss from mortality, partial or total condemnation of the carcass for human consumption, and regulatory enforcement. When animals are transported to slaughter with gross pathological lesions, many conditions will result in partial or total condemnation of the carcass as unfit for human consumption (7,8). A veterinarian at a slaughter plant might have a different opinion on the fitness of the animal for the journey that was undertaken and on the acceptability of the animal for slaughter for human consumption than that of the producer (9).

Other than for animals that are loaded into crates, handling and transport place physical requirements on animals to walk onto and off the vehicle, maintain stability in response to vehicular and animal movements, especially for some types of animals that remain standing for part of or the entire journey. Even fit cattle and pigs can experience difficulties during loading (10). During transport, animals have to make physiological adjustments to respond to periods without access to food and water and to make physiological responses to hot or cold conditions (11). If an animal is not fully fit it will be less able to cope with these challenges, and its welfare could deteriorate during the journey. The transportation of animals with a disease or injury is likely to exaggerate pre-transport issues. If before transport an animal had a clinical condition that was painful, transportation will almost certainly aggravate the pain and result in additional suffering. Some conditions affect physiological function, e.g., pneumonia can reduce exercise tolerance and capacity to deal with heat. Emaciated or weak animals may have reduced ability to obtain feed and water, are more susceptible to the combined effects of fasting and cold exposure and are less able to respond to other animals and events affecting their stability. Animals sent for slaughter with pre-existing conditions are more likely to die in transit, become non-ambulatory, or be euthanized on arrival than those that are healthy.

### **Potential responses of animals with existing pathology to transportation**

Other than for epidemiological type studies on commercial transportation, almost all research on the transportation of animals has been conducted on fit and healthy animals. Therefore, identification of the potential effects of transportation on animals with disease or injury requires an examination of the pathophysiology of pre-existing conditions in relation to the physical and physiological challenges of transportation. This examination indicates how these conditions likely affect an animal's ability to cope with transportation and potentially increase the risk of suffering.

Animals with painful conditions prior to loading are at risk of further pain if transported. Movement of or pressure on a painful area of inflammation, such as an arthritic joint, causes additional pain (12). Therefore, movement of body parts during loading, unloading, in response to vehicular movements or other animals, and during postural changes are likely to cause movement of the sensitive tissue and result in additional pain. For example, pigs sent for slaughter with an umbilical hernia were observed in a pen before transport to lie down less and have fewer aggressive interactions than clinically normal pigs (13).

Animals should not be transported to slaughter with a non-stabilized fracture as this will cause additional suffering (14). Bone fractures are painful; mechanical pressure applied to the fracture site or movement and mechanical distortion of fractured bone causes pain (15). Therefore, there is a major risk of additional pain arising from a decision to transport an animal with a fractured bone. Most lameness is caused by pain. Animals with painful foot lesions are more reluctant to bear weight on their feet than healthy animals (16) and pressure on a lesion causes additional pain (17). Therefore, walking up and down ramps and responses to other animals and vehicular movement to maintain stability have the potential to cause additional pain due to limb movement. Although it depends on many factors, cattle might have to adjust their footing at intervals, e.g., twice/hour to maintain their balance in response to vehicular movements (18). The condition of lame animals during a journey is likely to deteriorate as exercise associated with prolonged standing and responses to other animals and vehicular movement to maintain stability have the potential to aggravate the lameness. If a lame animal adopts a lying posture, but the other cattle remain standing it is likely to be susceptible to injury due to trampling (18).

During transportation a diseased animal may also feel ill (e.g., inappetence, thirst, and fever), be more susceptible to extremes in the thermal environment and might also be at increased risk of experiencing other negative emotional states, such as fear (because of disorientation or reduced ability to respond to perceived danger) and distress (19). Animals with respiratory pathology will have impaired capacity to cope with transportation. For example, calves with pneumonia often have clinical signs of fever, increased frequency of respiration, and decreased tidal volume. The severity of these physiological effects is related to the pathological changes in the lungs such as constriction of airways, accumulation of mucus within the lumen of airways, edema, and thickening of the mucous membranes (20). Calves in this condition have reduced lung function that can result in hypoxia from impaired oxygen supply (21). If pneumonia affects a large proportion of the lung, calves may not receive sufficient oxygen for muscular activity associated with handling and transport resulting in reduced exercise tolerance. During transport, animals need an efficient respiratory system to enable them to cope with environmental demands such as increased temperature and humidity that require the animal to lose heat from evaporation of water from its respiratory tract. When a calf responds to increased air temperature, it needs to be able to increase its respiration rate to provide an increased volume of air flow from the lungs (22). An emaciated or otherwise weakened animal may have reduced ability to obtain feed and water, and

**Table 1.** Examples of condemnations in Canadian federally inspected plants, 2008–2017.

Potential effect on ability to cope with transport	Condemnation reason <sup>a</sup>	Total number of cattle carcasses	Total number of pig carcasses	Total number of broiler chicken carcasses
Impaired cardiorespiratory system	Pneumonia	8846	35 241	5 515 204 <sup>b</sup>
	Pleuritis	759	11 517	
	Pericarditis	2107	5077	
	Endocarditis	1855	878	
Impaired locomotion	Arthritis	660	65 459	404 108 <sup>c</sup>
	Fracture	N/A	507	
Weakness	Emaciation	1184	6966	734 863
	Serous atrophy of fat	7135	1247	
	Anemia	N/A	4334	
Systemic pathology potentially affecting several physiological systems	Septicemia/toxemia/congestion	2286	13 884	4 914 679
	Peritonitis	6816	87 184	
	Edema	3436	785	
Pathology affecting metabolic systems	Hepatitis	2122	2233	7 483 264 <sup>d</sup>
	Jaundice	1180	12 466	
	Nephritis	1511	10 178	
	Pyelonephritis	1661	658	
	Uremia	41	597	
Infections causing weakness and discomfort	Abscess	3588	178 116	
	Metritis	427	N/A	
	Mastitis	27	N/A	
	Erysipelas		4253	
	Enteritis	31	16 871	
	Actinobacillosis	61	N/A	
Indicators of potential ill-health before transport <sup>e</sup>	Number dead-on-arrival or found dead in lairage pen	5215	145 611	16 510 939
	Condemned antemortem	4321	42 537	
Total number of animals slaughtered		27 615 524	200 005 892	6 238 832 662

<sup>a</sup> Only condemnations considered to indicate conditions that could potentially have affected the ability of the animal to cope with transportation are listed.

<sup>b</sup> Respiratory conditions.

<sup>c</sup> Leg conditions.

<sup>d</sup> Liver conditions.

<sup>e</sup> A proportion of the animals that die during or shortly after transport and those condemned antemortem are likely to have had pre-existing conditions that affected their fitness for the intended journey.

N/A — Not applicable.

<http://www.agr.gc.ca/eng/industry-markets-and-trade/canadian-agri-food-sector-intelligence/>

respond to external events such as vehicle motion or physical interactions with other animals. Weak animals are more likely to fall and be unable to get back up again and regain their footing. An animal in a poor body condition has limited fat reserves and is likely to be more susceptible to the combined effects of fasting and cold exposure.

### Condemnation statistics

Postmortem condemnation statistics (Tables 1, 2) show that a proportion of the animals sent for slaughter have identifiable pathological lesions that could have affected their physiological function and impaired their ability to cope with transportation. Many animals that are slaughtered with the types of gross pathology that resulted in the condemnations shown in Tables 1 and 2 are likely to have experienced ill-health on the farm. These types of pathological changes would also impair the ability of the animals to physiologically respond to transportation and increase their risk of suffering during transportation. In cattle, gross pathology identified postmortem as whole carcass condemnations, can be present when post-partum dairy cows that had experienced conditions such as dystocia and metritis are culled (23) and sent to slaughter. These types of postpartum

conditions can cause inflammation and systemic disease such as septicemia (24) and cull cows could have a reduced intake and a negative energy balance (25) before transportation, making them more susceptible to suffering during prolonged periods of transportation. Slaughtered pigs with gross pathology that was identified postmortem as septicemia were likely to have been ill (26) during transportation to slaughter and have had impaired physiological function (27) and muscle weakness (28). Lambs with pre-existing conditions (identified postmortem as condemnations due to abscess, arthritis, and pleuritis) can have an increased risk of dying during or shortly after transport (29).

### Survey data

Surveys show that some of the animals sent for slaughter are not fit on arrival. In a survey of pigs unloaded at a slaughter plant in the USA, 1% to 3% of the pigs were lame (unable to maintain pace with other pigs unloaded from the same trailer) (30). In a survey of 49 959 cattle from 1363 loads (55% steers, 20% heifers, and 25% mixed loads) that arrived at a federally inspected beef slaughter plant in Ontario after a median journey duration of 2.1 h (range: 0.3 to 68.3 h), 0.008% were dead, 0.002% were non-ambulatory, 0.008% required assistance to

**Table 2.** Examples of ovine condemnations in provincially inspected plants, Ontario, 2015–2017.<sup>b</sup>

Potential effect on ability to cope with transport	Condemnation reason <sup>a</sup>	Total number of lamb carcasses condemned/ 10 000 lambs slaughtered	Total number of sheep carcasses condemned/ 10 000 sheep slaughtered	Number of parts condemned/ 10 000 lambs slaughtered	Number of parts condemned/ 10 000 sheep slaughtered
Impaired cardiorespiratory system	Pneumonia	0.25	2.41	1280 <sup>c</sup>	2214 <sup>c</sup>
	Pleuritis	0.02	0.13		
	Endocarditis	0.05	0.13	16 <sup>d</sup>	49 <sup>d</sup>
	Pericarditis	0.05	0.26		
Impaired locomotion	Arthritis	0.68	2.15	7	16
Weakness	Emaciation	0.35	9.00		
	Mucoid degeneration	0	0.07		
	Anemia	0.02	0.13		
Systemic pathology potentially affecting several physiological systems	Septicemia	1.10	8.54		
	Peritonitis	0.33	2.22		
	Toxemia	0.10	0.52		
	Edema	0.03	0.07		
Pathology affecting metabolic systems	Jaundice	1.99	11.41		
	Cirrhosis	0	0.07	598 <sup>e</sup>	1724 <sup>e</sup>
	Nephritis	0.07	0.07	230 <sup>f</sup>	805 <sup>f</sup>
	Uremia	0.05	0.07		
Infections causing weakness and discomfort	Abscess	0.74	35.33	41	630
	Mastitis	0	0.20		
	Metritis	0.02	0.13		
	Other Disease/Condition	0.28	1.37		
Indicators of potential ill-health before transport	Dead on arrival <sup>g</sup>	0.16	0.46		
	Found dead <sup>h</sup>	5.07	9.19		
	Euthanized <sup>i</sup>	0.99	2.74		
	Moribund <sup>j</sup>	0.08	0.26		
Total number of animals slaughtered		606 950	153 396	606 950	153 396

<sup>a</sup> Only condemnations considered to indicate conditions that could potentially have affected the ability of the animal to cope with transportation are listed.

<sup>b</sup> 2017 data for 11 months January to November.

<sup>c</sup> Lung pathology (pneumonia, parasites, abscess, or adhesions).

<sup>d</sup> Heart pathology (adhesions, abscess, myocarditis, or pericarditis).

<sup>e</sup> Liver pathology (parasites, abscess, adhesions, or cirrhosis).

<sup>f</sup> Kidney pathology (nephritis, cystic, or abscess).

<sup>g</sup> Dead in vehicle before unloading at slaughter plant.

<sup>h</sup> Died in lairage pen at slaughter plant.

<sup>i</sup> Died following euthanasia at slaughter plant and not taken to slaughter.

<sup>j</sup> Close to death.

[www.omafr.gov.on.ca/english/stats/livestock/index.html](http://www.omafr.gov.on.ca/english/stats/livestock/index.html)

stand, and 0.158% were lame (31). As cull animals are sent for slaughter for production, breeding, and health reasons, some of these animals are not fit for transport due to painful conditions, lameness, emaciation, and ill-health that make them less able to cope with transport (7,32,33). In a survey of cattle transported > 400 km to or from Alberta during 2007 to 2008, 0.4% of cull cattle were lame at loading, 0.1% were lame at unloading, 0.3% were non-ambulatory, and 0.06% were dead on arrival (34). In a 2007 survey conducted in slaughter plants in the USA, Nicholson et al (35) observed that 2.7% of cull dairy cows were severely lame (i.e., displaying an arched back at all times and refusing to bear weight on 1 leg), 4% of cattle were extremely emaciated, and 4% had foot abnormalities. Compared with younger animals fattened for slaughter, there is an increased risk of cull cattle experiencing severe welfare issues, e.g., becoming non-ambulatory, and dying during the journey (34). Pigs sent for slaughter with pre-existing conditions are more likely to die, become non-ambulatory, or must be euthanized on arrival than those that are healthy (36,37). Unfortunately, some cull

animals that are in poor condition with lameness and respiratory disease are sent to an auction market (38). In addition, cull animals (e.g., dairy cows, sows, boars, ewes, and spent laying hens) can sometimes be transported long distances to specialized slaughter plants.

Due to the large numbers of birds, low light intensity, and the speed of handling, it can be challenging to assess the fitness of broilers during loading. Regular inspection of the flock and culling during the final stages of rearing should remove many of the birds that would not have been fit for transport. When Jacobs et al (39) undertook a rigorous assessment of the fitness of broilers before transport the main issues that they found were lameness, emaciation, and clinical signs of illness or injury. Broilers that were categorized as not fit for transport did not have significantly greater plasma corticosterone concentrations before transport than those deemed fit for transport. However, after a 14- to 18-hour period of crating and transport, unfit birds crated at either low or high stocking density had a greater plasma corticosterone concentration than those deemed to

**Table 3.** Appeal cases reported by the Canada Agricultural Review Tribunal following enforcement action by CFIA 2001–2017 on non-compliance with Section 138(2)(a) of the Health of Animals Regulations, i.e. loading and transport of an animal that cannot be transported without undue suffering.

Type of animal	Condition	Number of cases <sup>a</sup>	Estimated journey distance (km) <sup>b</sup>				
			Minimum	Q1	Median	Q3	Maximum
Pig	Lameness	19	8	30	60	202	535
	Non-ambulatory	9	20	35	152	201	400
	Hernia	8	24	31	132	313	420
	Prolapsed uterus or rectum	2	120		140		160
	Emaciation	1			160		
Cattle	Lameness	6	159	164	346	1068	1096
	Non-ambulatory	8	2	95	194	600	851
	Moribund	1			10		
	Pneumonia	1			348		
Horse	Blind	1			1710		
	Emaciation and infection	1			1233		
Sheep	Lameness	1			179		

<sup>a</sup> Where it was possible to estimate the journey distance.

<sup>b</sup> Based on information provided in The Canada Agricultural Review Tribunal case summaries at <http://cart-crac.gc.ca/>

have been fit for transport (39). In broilers, infectious diseases and cardiovascular disorders contribute to the risk of mortality during transport to slaughter. These birds may have been weakened and/or still have pathology that would affect their ability to physiologically respond to the challenges of handling and transport to the extent that they would be more likely to die during handling and transport than would healthy birds (40). Lupo et al (41) reported that the percentage of broilers found dead on arrival at a processing plant increased with the percentage of birds condemned after slaughter as not fit for human consumption due to the presence of macroscopic abnormalities. Lameness in broilers can impair access to drinking water during rearing resulting in dehydration (42). If these birds are then transported to slaughter, they are at increased risk of suffering during any prolonged period of water restriction. In pigs and poultry, genetic selection for rapid growth and muscle development has placed increased strain on cardiac function. During handling and transport, this can result in deaths due to cardiac failure and circulatory problems (40,43). One study of broilers showed that the prevalence of ascites and the ratio of the right ventricle to the total ventricular mass in broilers were greater in those that died during transport than in those that survived transport and were subsequently slaughtered (40). Reduced heart and lung capacity can affect a bird's physiological ability to deal with thermal stress (44).

### Enforcement action taken by the Canadian Food Inspection Agency (CFIA) on fitness for transport

In Canada, enforcement of Section 138(2)(a) of the *Health of Animals Regulations* that deals with fitness for transport is normally conducted *via* an administrative monetary penalty. The details of these cases are not reported publicly. However, if an appeal against an administrative monetary penalty is made to the Canada Agricultural Review Tribunal, a summary of the case is reported on the Tribunal's website (45). Although these cases are relatively few compared with the likely number of administrative monetary penalties issued, they do provide examples of the

types of conditions that the CFIA considers as non-compliance with the regulations (Table 3). Table 3 shows that most appeals against enforcement action involved pigs and cattle that were lame or were non-ambulatory on arrival or involved pigs with a hernia. The CFIA compromised animals policy states that an animal with reduced capacity to withstand transportation should not go through auction markets or assembly yards and must not travel long distances to a slaughter facility, even if the only slaughter facility is far away. Table 3 shows that some animals, which were not fit for transportation, were transported on long journeys. Fifteen of the 73 appeal cases, where sufficient information on the journey taken was provided in the case summary, involved animals that had been taken to an auction market or other holding facility. The animals in the other 58 cases were transported directly from a farm to a slaughter facility.

There are major difficulties with the enforcement of Section 138(2)(a) of the *Health of Animals Regulations*. Twenty of the 87 appeal cases for enforcement of Section 138(2)(a) of the *Health of Animals Regulations* that were listed on the Canada Agricultural Review Tribunal website between 2011 and 2007 (45), were successful in that the Tribunal determined that no violation had occurred. Although the CFIA as the enforcement agency for the *Health of Animals Regulations* considers that commercial practice should not diminish the protection that should be provided to animals during transport by the regulations, the Canada Agricultural Review Tribunal appears to view their role as maintaining a balance between the conduct of regular commercial activities in the agricultural and agri-food production systems and the protection of the animals in those systems. For example, the Tribunal has stated in case summaries on their website that "It is a business reality that animals may be or in fact are in a state of discomfort, distress or suffering during transport" (45). This wording is unfortunate as it should be possible to transport animals without causing them distress or suffering. As accepted in industry standards or Codes of Practice (46), if animals are found to be in distress or suffering immediate remedial action is required and standards of care should be such that distress or suffering should not occur routinely.



In addition, the legal interpretation by the Federal Court of Appeal of Section 138(2)(a) of the *Health of Animals Regulations* has imposed rigorous requirements on the CFIA to provide evidence that the condition of the animal at a slaughter plant could not have been caused by the journey, that the condition was definitely present before loading, and that those involved should have been able to determine that the animal was not fit for transport. The CFIA is also required to demonstrate that the animal could not have been transported without undue suffering, suffered unduly during the journey, and that there was a causal link between the transportation, the undue suffering, and the animal's condition (45).

### Guidelines and decision trees

Guidelines and decision trees, e.g., in NFACC codes (46) that include examples of the types of clinical conditions that would make an animal unfit for transport, are extremely useful. However, various stakeholders have different views on the criteria for determining the severity of lameness and poor body condition that would make an animal unfit for transport (47,48). There is a potential conflict between the avoidance of the risk of suffering arising from a decision to not transport an animal that is not fit for transport and the financial loss associated with on-farm euthanasia compared with the potential return to a producer from transporting the animal for slaughter so that it can be sold for human consumption (9). There are very limited options for on-farm slaughter with transport of the carcass to a slaughter plant, but where this option is available, it is likely to reduce some of the dilemmas associated with decisions on fitness for transport and economics (9,49). A survey of Danish livestock drivers who transported dairy cows showed that almost all of them considered that they had a good knowledge of the regulations on fitness for transport of dairy cows, 41% did not or rarely used the information provided on a compulsory training course on this topic, but only 52% were able to correctly answer specific questions on fitness for transport. Drivers (35%) had either sometimes or often been unsure about the fitness for transport of 1 or more dairy cows. Only 27% of the drivers had never loaded an unfit dairy cow. The reasons for having loaded an unfit cow were i) it was only judged unfit for transport upon arrival at the slaughterhouse; ii) they believed that the cow would be better off slaughtered rather than kept to recover on-farm; iii) it would be ethically unacceptable not to slaughter an animal that was suitable for human consumption; and iv) pressure from producers to load cows with questionable fitness for transport (50).

The approach taken by the veterinary profession when advising on or certifying fitness for transport is critical. A study in Ireland identified that in some cases there had been a default culture of certifying animals as fit for transport, whereas others were reluctant to make a judgment on the severity of a condition in relation to the risk of suffering during the intended journey (9). As part of herd health and welfare plans, veterinarians should encourage clients to develop protocols for early identification of animals that need to be culled or treated. Veterinarians have an ethical responsibility to advise and educate clients on the selection of animals that are fit for the anticipated transport conditions and will not suffer during the journey (6).

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